

## CLAIMS

1. Fluid sensor containing a fluid cell (1) to enclose a volume of fluid (7), i.e. gas or liquid, that is to be analysed, said fluid  
5 sensor comprising an electromagnetic energy source (3) arranged to transmit electromagnetic waves (4) into the fluid cell (1) and at least one detector (5) to detect electromagnetic waves passing through the fluid cell (1) and at least one opening (2) for the inlet/outlet of fluid that is to  
10 be analysed, and a circuit board (8,10,11,12,13,14,15,16) to evaluate the intensity of electromagnetic waves reaching said at least one detector (5) and/or to provide the circuitry for the electromagnetic energy source (3), **characterized** in that at least part of the fluid cell (1) is incorporated into the  
15 substrate of the circuit board (8,10,11,12,13,14,15,16).
2. Fluid sensor according to claim 1, **characterized** in that it is a gas sensor.
- 20 3. Fluid sensor according to claim 1, **characterized** in that it is a liquid sensor.
4. Fluid sensor according to any of the preceding claims, **characterized** in that at least part of the internal walls of the  
25 fluid cell (1) are coated with a material ( ) that is reflective to the electromagnetic waves (4) passing through the fluid cell (1).
5. Fluid sensor according to claim 4, **characterized** in that at  
30 least part of the internal walls of the fluid cell (1) are coated with a metal such as gold or silver.
6. Fluid sensor according to any of the preceding claims, **characterized** in that the electromagnetic energy source (3)  
35 and/or said at least one detector (5) is/are mounted on the circuit board (8,10,11,12,13,14,15,16).

7. Fluid sensor according to any of the preceding claims, **characterized** in that the electromagnetic energy source (3) is a light source, such as an infrared light source and said at least one detector (5) is an optical detector.
- 5 8. Fluid sensor according to any of the preceding claims, **characterized** in that the the circuit board of the fluid sensor comprises a heat-generating component in the vicinity of the fluid cell.
- 10 9. Fluid sensor according to any of the preceding claims, **characterized** in that the fluid cell extends through the circuit board (8,10,11,12,13,14,15,16) and/or across the circuit board .
- 15 10. Fluid sensor according to any of the preceding claims, **characterized** in that the fluid cell (1) is fully embedded in the substrate of the circuit board (8,10,11,12,13,14,15,16).
- 20 11. Fluid sensor according to any of claims 1-8, **characterized** in that the fluid cell (1) extends along a surface of the circuit board (8,10,11,12,13,14,15,16).
- 25 12. Fluid sensor according to any of the preceding claims, **characterized** in that the fluid cell (1) is built up of a plurality of circuit boards (8,10,11,12,13,14,15,16) stacked together.
- 30 13. Fluid sensor according any of the preceding claims, **characterized** in that it comprises a plurality of fluid cells (1) incorporated into the substrate of the circuit board (8,10,11,12,13,14,15,16).
- 35 14. Fluid sensor according to claim 13, **characterized** in that it the plurality of fluid cells (1) comprises at least one test channel to determine the attenuation at a wavelength not influenced by a fluid (7) that is to be analysed, but close to it,

to provide a measure of the variation of the electromagnetic signal influenced by environmental parameters and not by the analysed fluid.

- 5 15. Fluid sensor according any of the preceding claims, **characterized** in that it comprises a flexible circuit board (8,10,11,12,13,14,15,16).
- 10 16. Method for producing a fluid sensor having a fluid cell (1), **characterized** in that it comprises the step of forming a trench having at least one substantially smooth surface in the substrate of a circuit board (8,10,11,12,13,14,15,16) which will constitute at least part of a fluid cell (1).
- 15 17. Method according to claim 16, **characterized** in that it comprises the further step of coating at least part of the, or each, wall of the trench with a material (9) that is reflective to the electromagnetic waves (4) that pass through the fluid cell (1), such as a metal.
- 20 18. Method according to claims 16 or 17, **characterized** in that it comprises the further step of stacking a plurality of circuit boards (8,10,11,12,13,14,15,16) together so as to form a fluid cell (1).
- 25 19. Use of a fluid sensor according to any of claims 1-15 for determining the concentration of a gas (7) such as carbon dioxide, carbon monoxide, a hydrocarbon, nitrous oxide or a liquid hydrocarbon or any other gas or liquid having attenuation bands in the infrared range.
- 30 20. Use of a fluid sensor according to any of claims 1-15 for determining the concentration of carbon dioxide in the exhaled air of a person or a person's breathing frequency.

21. Use of a fluid sensor according to any of claims 1-15 as a trace gas or liquid meter.

5 22. Use of a fluid sensor according to any of claims 1-15 for determining the pressure, structure or composition of a gas or liquid.

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